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[54] SIGNAL TRANSMITTING METHOD, TRANSMITTER, RECEIVER, AND SPREAD-SPECTRUM CODE SYNCHRONIZING METHOD FOR MOBILE COMMUNICATION SYSTEM

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[52] **U.S. Cl.** **370/335**; 370/342; 370/441; 370/503

[58] **Field of Search** 370/335, 342, 370/441, 320, 350, 515, 503, 509, 519; 375/200, 208, 209, 210, 359, 365, 367

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[57]   ABSTRACT

Achieving high speed spreading code synchronization of a forward link control channel. A control channel information signal and traffic channel information signals are each spread by different first spreading codes which are fed from a first spreading code (short code) generator (11), and which have a period equal to the period of an information symbol. Subsequently, only the control channel information signal is spread by a third spreading code which is fed from a third spreading code (long code masked portion complex conjugate code) generator (12), and which has a form of complex conjugate of a long code (second spreading code) used for spreading in common. The signals of the entire channels are summed up by an adder (13) at appropriate timings, and the resultant sum is spread by the second spreading code fed from a second spreading code generator (14), thereby being output as a spread modulation signal.

30 Claims, 31 Drawing Sheets

INITIAL STAGE OF COMMUNICATIONS

SEARCH MODE

S1000

DETECTION OF SHORT CODE CORRELATION PEAK PHASE
SEARCH FOR K PERIODS OF A LONG CODE BY A MATCHED FILTER USING A SHORT CODE AS A SPREADING CODE REPLICA

S1300

DETECTION OF MAXIMUM CORRELATION PEAK
DETECT MAXIMUM CORRELATION PEAKS IN A SEARCH RANGE FOR K PERIODS OF THE LONG CODE, AND STORE SPREADING CODE PHASES AT THE PEAKS

DETECTION OF DOMINANT N CORRELATION PEAKS
DETECT DOMINANT N CORRELATION PEAKS IN THE SEARCH RANGE OF K PERIODS OF THE LONG CODE, AND STORES THE SPREADING CODE PHASES AT THE PEAKS

S1100

S1400

LONG CODE SEARCH
DETECT CORRELATIONS OF A TYPES OF LONG CODES WITH REFERENCE TO THE MAXIMUM CORRELATION PEAK OF THE SHORT CODE, AND DECIDE SYNCHRONIZATION

LONG CODE SEARCH
DETECT CORRELATIONS OF B TYPES OF LONG CODES OF CONTIGUOUS CELLS WITH REFERENCE TO THE DOMINANT N SPREADING CODE PHASES ASSOCIATED WITH THE CORRELATION PEAK LEVELS OF THE SHORT CODE, AND DECIDE SYNCHRONIZATION

DETECT ACQUISITION NO / DETECT ACQUISITION YES

S1200

START COMMUNICATIONS PROCEED TO DEMODULATION AND SEARCH MODE

DETECT ACQUISITION NO / DETECT ACQUISITION YES

PROCEED TO RECEIVED SIGNAL LEVEL MEASUREMENT OF CONTROL CHANNELS OF CONTIGUOUS CELLS, OR HANDOVER CELL DECISION